MWH

BUILDING A BETTER WORLD

REPORT

50 Year Wastewater Strategy

Prepared for Waikato District Council

December 2014

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Executive Summary

The 50 Year Wastewater Strategy for the Waikato District Council (WDC) is framed around understanding the future needs of each community and includes the development of wastewater treatment and disposal infrastructure options to meet the forecast wastewater flows. The strategy leverages from existing information and reviews it holistically from a district-wide perspective to identify options to improve efficiency. This document will be used by WDC to write up the wastewater aspects of Council's infrastructure strategy.

The strategy also identifies the short term investigations required to support the forecasts for the 50 year capital infrastructure requirements for wastewater treatment and outfall pipeline infrastructure. These capital infrastructure requirements will be used to inform the development of Council's 2015/25 Long Term Plan.

The 10 wastewater schemes across the district were grouped by wastewater treatment plant (WWTP) as follows:

- Central District - Ngaruawahia (including Hopuhopu, Horotiu and Taupiri); WWTP at Ngaruawahia
- Huntly (including Te Ohaki)
- Mid Waikato - Te Kauwhata (including Rangiriri); WWTP at Te Kauwhata
- Raglan
- Meremere
- North Waikato (Tuakau and Pokeno); Pukekohe WWTP by Watercare
- Maramarua
- Te Kowhai
- Matangi
- Tauwhare Pa.

Key tasks in the development of this strategy included review of the wastewater consenting context and levels of service, preparation of individual wastewater scheme summaries and wastewater flow forecasts, development and evaluation of strategic options and preparation of the supporting reports.

Policy and regulatory context review

The important findings from the wastewater consenting context review are that WDC currently has issues achieving acceptable compliance levels at a number of plants (particularly at plants that discharge to water) and the policy framework within the Waikato Region has changed significantly since a number of the existing permits currently held by WDC were obtained. Policy themes of particular relevance include: shorter consent durations, achievement of environmental enhancement, a hierarchical approach to avoid, remedy and mitigate, setting objectives based on managing water bodies to meet community expectations and scientifically-informed national bottom lines for several key attributes of water quality.

It is envisaged that new discharge consents to the Waikato River will require the capping or further reduction of mass loads from currently consented levels. It may be informative to undertake an integrated assessment to assess mass load contributions to the Waikato River from all WDC wastewater treatment plants alongside future population growth projections. This may enable some flexibility between communities/schemes/treatment plants to manage future discharges under this approach.

Levels of service review

The levels of service review considered both the local government mandatory non-financial performance measures for water supply and Council's current internal levels of service. The key level of service gaps are related to overflows and consent compliance. WDC has some known issues with wet weather overflows due to inflow or infiltration and the lack of pump station storage to prevent overflows. These

issues have not yet been captured in the performance measure results as WDC only started recording pump station overflows to the environment during the last six months.

WDC have agreed a programme of works with the Waikato Regional Council to address the outstanding non compliances for discharge consents.

Key wastewater management risks

The key wastewater management risks identified through this work include the uncertainty of the future policy framework within the Waikato Region, inflow and infiltration (I&I) and the resultant peak wet weather overflows, discharge consent non-compliance (for concentration, load and/or flow), sludge management, odour issues and the availability of flows and loads data particularly for the smaller plants. The recommended investigations required in the short term that are common to multiple wastewater schemes included:

- Investigate potential (through discussions with WRC) for regional based, combined mass load (nitrogen and phosphorous) consent limits for discharges to the Waikato River from WDC WWTPs
- Continue I&I strategy and implementation plan for each scheme with high I&I, including develop hydraulic models, investigate sources of I&I and undertake remedial measures to the sewer network where required.
- Investigate the infrastructure requirements for installation of emergency storage at local pumpstations to manage overflow risk.
- Review trade waste flows and quality from significant industrial/commercial customers (both current and future), particularly in Mid Waikato and North Waikato
- Investigate district-wide or regional sludge/biosolids treatment and reuse/disposal options.
- Investigate source of odour issues (e.g. long retention times in network can cause septicity and odour released at inlet works, anaerobic ponds).
- Undertake a detailed assessment for each of the existing Matangi, Maramarua, Tauwhare Pa and Te Kowhai WWTPs to confirm existing design capacity and then develop and cost augmentation works to meet the forecast future flow projections.

Flows and loads forecasts

The forecasts prepared for each scheme were baseline WWTP inflow flow forecasts based on a single set of growth assumptions and per capita generation rate with no allowance for reduction in wastewater flows due to water demand management activities (affecting average flows) or an inflow and infiltration programme (reducing peak wet weather flows). Load forecasts were not included as a detailed assessment of scheme specific loads needs to be carried out as part of specific WWTP upgrade investigations for each scheme.

Over the next 50 years, the existing larger schemes are predicted to experience medium to high growth and the existing smaller schemes are predicted to experience low or no growth. Of the larger schemes, high growth is forecast for North Waikato (ie towns of Tuakau and Pokeno, which discharge to Watercare's Pukekohe WWTP) and Mid Waikato (ie Te Kauwhata WWTP) and medium growth is predicted for Central District (ie Ngaruawahia WWTP), Huntly and Raglan. Of the smaller schemes, low growth is forecast for Meremere, Matangi, Tauwhare Pa and Te Kowhai and no growth is forecast for Maramarua.

Strategic wastewater issues and options

The Ngaruawahia and Huntly WWTPs are not expected to exceed their discharge resource consent flow, concentration and load limits before consent expiry in 2028. The one exception is that Huntly WWTP currently, and is likely to continue to, regularly exceed the concentration limit for total suspended solids. In the short term, providing solids removal at Huntly was seen as the preferred solution to reduce algal solids and ensure compliance with current consent. In the longer term, upgrading the existing Ngaruawahia and Huntly WWTPs to cater for future growth is the lowest cost solution on the basis that more stringent river discharge standards are not imposed when a renewal is sought for the resource consent. If major augmentations are required at both Ngaruawahia and Huntly WWTPs in 2028 to meet future consents, the provision of a new centrally located advanced WWTP servicing both areas is considered to be the best long term solution based on the overall Multi-Criteria Assessment (MCA).

Upgrading the existing WWTPs to cater for future growth is the preferred option carried forward to the capital infrastructure requirements.

The Te Kauwhata WWTP discharge resource consent limits for both average and peak flows are predicted to be exceeded near the time the current consent expires in 2045. Discharge to the Waikato River with rapid infiltration columns was seen as the preferred long term solution for the Mid Waikato scheme.

Raglan's maximum flow discharge is predicted to consistently exceed the current consent limit near the time the current consent expires in 2020, with occasional breaches from time to time before that. The Raglan WWTP also regularly exceeds the current concentration limits for pathogens and total suspended solids and peak flow limit. Provision of a new ocean outfall was the preferred option for Raglan from the MCA workshop. Affordability of this option by the local community would need to be assessed before proceeding further. Alternatively, upgrading the existing WWTP to cater for future growth, provide some nutrient reduction and attenuate peak flows would comprise a suitable long term solution provided that significantly more stringent discharge standards are not imposed when a renewal is sought for the Raglan WWTP discharge resource consent.

The Meremere WWTP currently consistently exceeds the consent limits for maximum discharge flows and all parameters except pathogens and phosphorous (consent expiry in 2018). Existing river discharge standards are very stringent and cannot be guaranteed with pond based technology. The capital infrastructure forecasts for Meremere have been shown as either transfer to Pokeno (treatment by Watercare, this option would have a very high cost per property) or upgrade of the existing Meremere WWTP for flow balancing, TN (Total Nitrogen) and Total Suspended Solids (TSS) control.

The North Waikato scheme services the townships of Tuakau and Pokeno and transfers wastewater to the Pukekohe WWTP (owned and operated by Watercare). It is understood that there are no limits currently agreed beyond 2019. The long term servicing for Pokeno and Tuakau remains with the status quo of discharge of wastewater to the Pukekohe WWTP owned by Watercare. There are short term flow constraints on discharges to the Watercare system until the next upgrade of the Pukekohe WWTP which is scheduled to be completed by 2019. WDC will need to manage flow increases from new trade waste customers to ensure that adequate residual capacity exists to cater for the rapid residential growth that is occurring in Pokeno.

The four very small plants at Matangi, Maramarua, Tauwhare Pa and Te Kowhai are at or near capacity or are breaching treated wastewater quality consent limits. Further investigation work is required for these very small plants as listed in the recommendations above.

Capital infrastructure requirements

Indicative capital cost estimates were developed for all infrastructure requirements outlined above over the 50 year horizon. These cost estimates are high level estimates for strategic planning purposes only and are based on indicative unit rates with limited site specific details. Typical levels of accuracy of +/- 30%. These cost estimates are provided in Section 4.2 of this report.

Waikato District Council

50 Year Wastewater Strategy

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1 Introduction

1.1 Purpose of this report

Waikato District Council (WDC) is currently reviewing its three waters services to develop a long term strategic plan for infrastructure investment and service provision. This initiative is a response to the need for longer term infrastructure planning and to ensure Council is in a sound position to meet the needs of anticipated growth (or changes in community requirements) across the District over time.

The purpose of this report is to provide a high level wastewater strategy foundation document for the WDC that is framed around understanding the future needs of each community and includes the development of wastewater treatment and disposal infrastructure options to meet the forecast wastewater flows. The strategy leverages from existing information and reviews it holistically from a district-wide perspective to identify options to improve efficiency. This document will be used by WDC to write up the wastewater aspects of Council's infrastructure strategy.

The 11 wastewater schemes across the district were grouped by wastewater treatment plant as follows:

- Central District - Ngaruawahia (including Hopuhopu, Horotiu and Taupiri); wastewater treatment plant (WWTP) at Ngaruawahia
- Huntly (including Te Ohaki)
- Mid Waikato - Te Kauwhata (including Rangiriri); WWTP at Te Kauwhata
- Raglan
- Meremere
- North Waikato (Tuakau and Pokeno schemes); Pukekohe WWTP by Watercare
- Maramarua
- Te Kowhai
- Matangi
- Tauwhare Pa.

1.2 Scope of this report

The methodology for preparing the Waikato District Council 50 Year Wastewater Strategy was as follows:

1. Review information
2. Review the wastewater policy and consenting context
3. Assess levels of service performance measures and current scheme performance
4. Prepare individual wastewater scheme summaries
5. Prepare baseline flow and load forecasts
6. Develop strategic options
7. Undertake options evaluation workshop
8. Refine options and costs
9. Prepare Stage 1 report
10. Prepare Strategy document

This strategy report should be read in conjunction with the Stage 1 report "Preparing a 50 Year Wastewater Strategy for the Waikato District", MWH December 2014. The Stage 1 report is a summary document that records the approach taken in developing the Waikato District 50 Year Wastewater Strategy. The Stage 1 report provides detailed information for each of the methodology steps.

1.3 Outside Scope Items

The 50 Year Wastewater Strategy is focussed on understanding wastewater management challenges and high level wastewater management options. Key items outside of the scope of this strategy and strategic advice that still need to be part of a successful wastewater management service include:

- Identification of asset reliability improvements, for example through a detailed wastewater treatment plant capacity utilisation.
- Identification of required asset renewals.
- Identification of network upgrades required to meet growth.
- Adequate network models for all major schemes.
- Assessment of transmission network capacity and performance (not yet available).
- A detailed assessment of the impacts of inflow and infiltration and any mitigation measures on future demand forecasts.
- A detailed assessment of load contributions from trade waste generators, key industry and septage handling facilities for major schemes.
- Assessment of current and future sludge and biosolids management requirements of the District, including consideration of changing requirements after any significant wastewater treatment plant upgrade.
- Discussion with Watercare about flow and load limits in current and future discharge agreement for North Waikato
- Identification of any existing un-serviced areas that require servicing in the future to protect public health. These areas are currently serviced by on-site wastewater treatment and disposal systems.

1.4 Risks

Risks related to the 50 Year Wastewater Strategy include the inherent risks in the capital infrastructure, flow and load forecasts and the wastewater risks for each scheme.

The Waikato District Council Risk Management Policy and associated Risk Management Framework were adopted in March 2014. This policy describes the systems that the Council has in place to identify and manage risks which could prevent the Council from achieving its strategic objectives. The risks for the wastewater activity have been described in brief in the Waikato District Council 2014 Wastewater Activity Management Plan.

Key wastewater risks for the District given in the Waikato District Council's Activity Management Plan for Wastewater include inadequate project management and capital works management, inadequate condition/performance assessments, non-compliance with resource consents, natural hazard damage, and network break or blockage.

2 Context

2.1 Geographic context

The Waikato District Council covers an area of just over 418,000 ha in the Waikato region.

The District encompasses a diverse area. It borders Hamilton City, Waipa District and Otorohanga District Councils to the south, extends to the West Coast, includes the plains to the east bordering Hauraki District and Matamata Piako District Councils and stretches north as far as Pokeno and Tuakau (bordering Auckland Council). It has a large rural population, many small communities and six major towns; Huntly, Ngaruawahia, Raglan, Te Kauwhata, Pokeno and Tuakau. Both State Highway 1 and the Waikato River traverse the full length of the district from South to North along its central axis. The region's primary industry is dairy farming and mining with high quality soils located in the central, eastern and far north parts of the district. A map of the wastewater schemes in the Waikato District is provided in Figure 2-1. Individual wastewater scheme plans are included in the Stage 1 report.

The District has a temperate climate with moderate annual rainfall.

WDC provides wastewater networks to the community for domestic and industrial use. Council currently has wastewater treatment plants at Huntly, Meremere, Ngaruawahia, Raglan and Te Kauwhata with smaller treatment facilities at Maramarua, Matangi, Tauwhare Pa and Te Kowhai. The larger schemes primarily service the urban areas of the district. The smaller schemes service villages. WDC also owns a wastewater scheme in North Waikato (Pokeno and Tuakau). Sewage from the North Waikato scheme goes to the Pukekohe WWTP owned by Watercare.

In addition to urban and commercial customers, Brinks and the Spring Hill Corrections facility are key customers. Spring Hill Corrections is the only customer which has a current individual service agreement in place. Discussions are in progress with Yashili, a major dairy company, to develop a special agreement which covers water and wastewater servicing for its site in Pokeno. Once the company is in production (scheduled 2015), Yashili will become Council's largest trade waste customer.

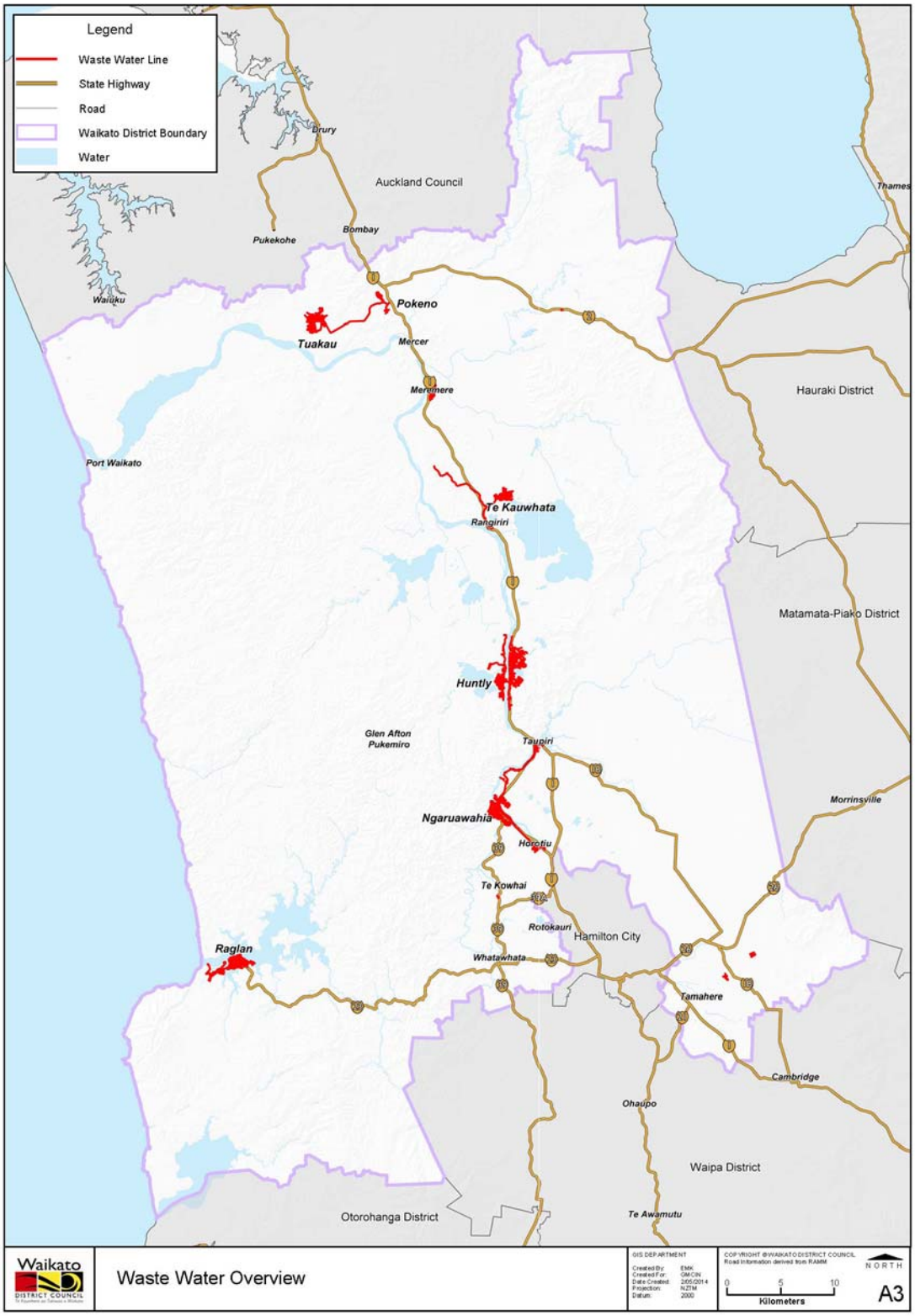

Figure 2-1 : Map of the wastewater schemes in the Waikato District

2.2 Population context

WDC provided the current residential connections and population for each wastewater scheme. WDC also provided scheme specific Long Term Plan township projections for the number of new residential connections and occupancy for each five year period until 2045. WDC has calibrated these projections against the latest Future Proof sub-regional projections (University of Waikato National Institute of Demographic and Economic Analysis Population forecasts prepared in August 2014). In addition to the forecast growth in new residential connections, an allowance was made for the future connection of existing properties in Raglan, Pokeno and Tuakau that are currently serviced by on-site wastewater systems.

The assumed residential connection growth from 2046 to 2065 was based on the average annual growth in residential connections from 2040 to 2045. The current and future population and residential connections are shown in Table 2-1 by wastewater scheme. The basis for the population and residential connection estimates is documented in detail in the Stage 1 report.

Table 2-1: Current and future population and residential connections by wastewater scheme

Wastewater Scheme	Current # of residential connections	Current Population Estimate	Forecast # of new residential connections between 2015 and 2065	# of existing properties to be connected
Central District	2,216	6,426	1,686	
Huntly	2,743	7,571	948	
Mid Waikato	457	1,170	1,533	
Raglan	1,820	4,131	628	50
Meremere	174	529	9	
North Waikato	1,513	4,236	4,544	640
Matangi	55	156	84	
Maramarua	9	24	0	
Tauwhare Pa	43	125	12	
Te Kowhai	22	59	11	
TOTALS	**9,052**	**24,427**	**9,455**	

The projections for the number of residential connections have been summarised by wastewater scheme in Figure 2-2.

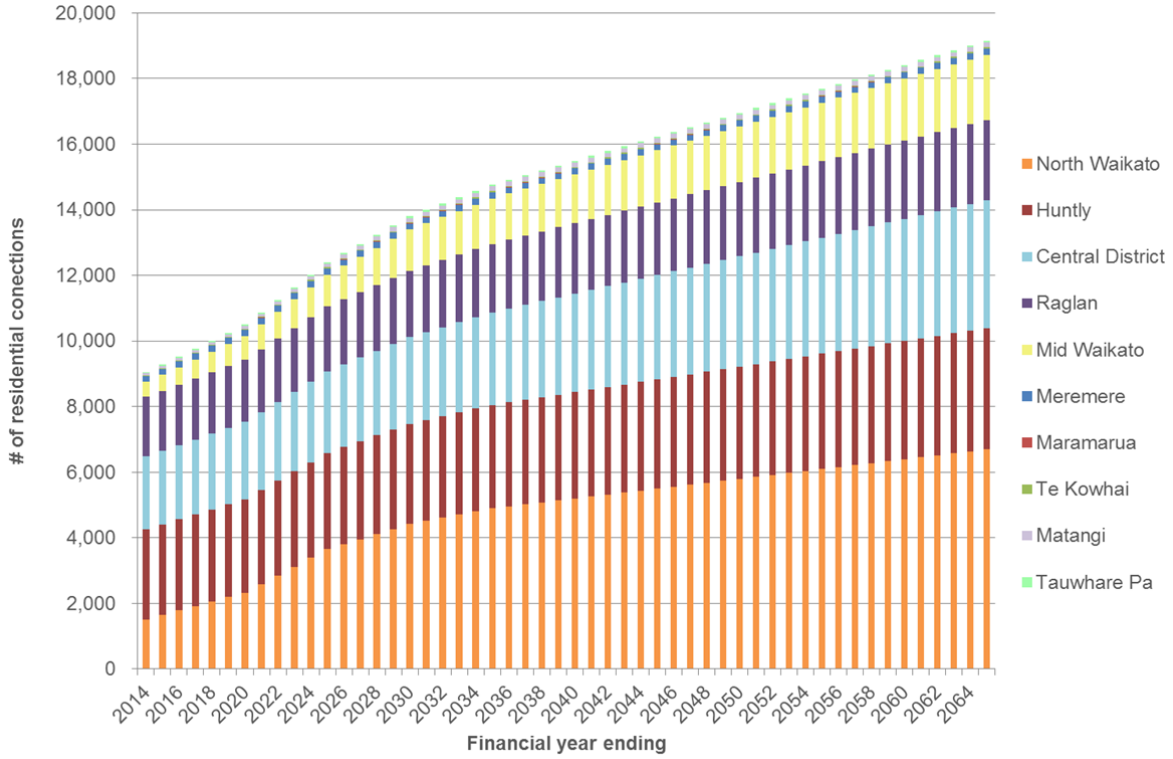

Figure 2-2: Breakdown of forecast for number of residential connections by wastewater scheme to 2065

Figure 2-2 shows that the North Waikato wastewater scheme is expected to have the highest residential growth, followed by the Mid Waikato wastewater scheme. The five small community schemes are expected to have very little growth.

2.3 Strategic context

There is increasing national focus on the value of natural water resources and the way freshwater is managed in New Zealand. National directives are interpreted at a local scale through regional planning frameworks and resource management agreements. The 50 Year Wastewater Strategy for Waikato District Council has been developed in this context, drawing on specific direction provided by the Waikato Regional Council and established through significant regional partnerships.

Key aspects associated with regional planning and future wastewater management for the District have been summarised in the wastewater "Policy and Regulatory Context" report appended to the Stage 1 report and include:

- Resource Management Act, 1991
- Local Government Act, 2002
- Waikato Raupatu Claims (Waikato River) Settlement Act 2010
- National Policy Statement for Freshwater Management, 2014
- National Environmental Standard for Sources of Human Drinking Water, 2008
- NZ Coastal Policy Statement
- New Zealand Municipal Wastewater Monitoring Guidelines 2002
- Operative Waikato Regional Policy Statement, 2000
- Proposed Waikato Regional Policy Statement, 2010
- Waikato Regional Plan, 2000
- Waikato Regional Coastal Plan
- Waikato-Tainui Environmental Plan (August 2013)
- Future Proof, 2009

- Future Proof Three Waters Strategy (September 2012)
- Healthy Rivers: Plan for Change/Wai ora: He Rautaki Whakapaipai
- Waikato District Growth Strategy, 2009
- Franklin District Growth Strategy, 2007.

The Future Proof context is further described in the following paragraphs. In 2009 Waikato Regional Council, Hamilton City Council, Waipa and Waikato District Councils and Taangata Whenua developed the sub regional growth strategy known as "Future Proof" which covered a 50 year horizon looking at all aspects of growth from planning to infrastructure. From this it was identified that the Three Waters needed to be considered holistically and that the issues facing the Three Waters in the region went beyond growth.

In 2012, Council adopted the Sub Regional Three Waters Strategy, this document sets the strategic focus and direction on critical Three Waters issues across the sub region. Development of a sub regional action plan was a requirement for implementation out of this Sub Regional Three Waters strategy. Council has been working with its partner councils (Hamilton City and Waipa District) to develop a sub regional action plan to address the strategic issues identified in the strategy.

This Waikato District 50 Year Wastewater Strategy will support the sub regional strategy with the district focus for Waikato.

2.4 Wastewater consenting context

The wastewater "Policy and Regulatory Context" report appended to the Stage 1 report also provided an overview of the Operative Waikato Regional Plan's approach to wastewater management and the implications for a network operator. The "Policy and Regulatory Context" report provides a review of the likely consent requirements and any potential consenting issues that Waikato District Council may face in the future with regards to their wastewater network. Conclusions from this review of the wastewater consenting context are as follows:

- WDC currently has issues achieving acceptable compliance levels at a number of plants. Non-compliance is particularly an issue at plants that discharge to water.
- The policy framework within the Waikato Region has changed significantly since a number of the existing permits currently held by WDC were obtained. Policy themes that are considered to be of particular relevance include:
  - Shorter consent durations;
  - Achievement of environmental enhancement;
  - A hierarchical approach to avoid, remedy and mitigate;
  - With particular reference to discharges to freshwater:
    - Setting objectives based on managing water bodies to meet community expectations;
    - Scientifically-informed national bottom lines for several key attributes of water quality;
    - Requirements to monitor progress towards achieving freshwater objectives; and
    - Requirements that councils put in place measures to better account for the water taken out of water bodies, and the contaminants going in.
- With regards to the future direction of mass load conditions for total nitrogen and total phosphorous (nutrients) for discharges to the Waikato River (Ngaruawahia, Huntly and Meremere), given the emerging policy framework it is envisaged that new discharge consents will require the capping or further reduction of mass loads from currently consented levels. This has implications in terms of increasing volumes of raw wastewater requiring treatment (in response to population growth) and the resultant need to achieve a greater degree of treatment for nutrient removal. Alternatives to the direct discharge of wastewater to the Waikato River will also require investigation with the objective of achieving the same outcome of reducing the mass load of nutrients discharged to the River. Given this policy framework in relation to mass loads, it may be informative to undertake an integrated assessment to assess mass load contributions to the Waikato River from all WDC treatment plants alongside future population growth projections. This may enable some flexibility between communities/schemes/treatment plants to manage future discharges under this approach.
- With regards to the discharge to Lake Waikare from the Te Kauwhata WWTP, it is understood that as part of the consultation process undertaken through the application process, a memorandum of

understanding (MOU) was agreed to and signed by the members of the Te Kauwhata Wastewater Treatment Consultation Group. This MOU included a timeline of progress points for the removal of the discharge to Lake Waikare within 15 years. In addition, and as agreed with the Consultation Group, conditions of consent require the applicant to investigate the feasibility of alternative discharges at specified times during the duration of the consent.

2.5 Levels of service

The wastewater levels of service assessment is detailed in the technical memorandum "Wastewater Levels of Service Assessment" appended to the Stage 1 report. This assessment reviewed and summarised the local government mandatory non-financial performance measures for wastewater and Council's current levels of service and associated performance provided across the Council's wastewater schemes and identified inconsistencies. The assessment also includes comparison of the WDC context against industry best practice and recommendations to improve consistency and performance measures.

Key level of service gaps are related to overflows and consent compliance. WDC has some known issues with wet weather overflows due to inflow or infiltration and the lack of pump station storage to prevent overflows. These issues have not yet been captured in the performance measure results as WDC only started recording pump station overflows to the environment during the last six months.

The schemes with the worst compliance performance in terms of notices are Raglan (one fine and one infringement notice) and Te Kauwhata (one infringement notice). Ngaruawahia, Meremere and Te Kowhai all had partial consent compliance in 2013/14. WDC have agreed a programme of works with the Waikato Regional Council to address the outstanding non compliances for discharge consents. The proposed works are included in the scheme discussions in Section 3.

When looking to the future, the levels of service assessment also highlighted the need to investigate options and prepare a long term plan for sludge management. WDC may also wish to consider a performance measure related to the potential for beneficial reuse of biosolids.

2.6 Basis for flow forecasts

MWH prepared 50 year WWTP influent flows forecasts for each of the wastewater schemes. Influent flows to the WWTP were developed rather than the WWTP discharge flows as influent flows are the basis for the design of any WWTP upgrades. For the larger schemes, historic WWTP inflows were compared to discharge flows to estimate attenuation (if any) of peak flows through the WWTP.

The underlying assumptions and methodology are documented in detail in the Stage 1 report. A basic description of the methodology is as follows:

- Average Dry Weather Flow - ADWF (lowest monthly average daily flow from January to April, inclusive) was predicted for each WWTP using a per capita generation rate in L/person/day and the projected population.
- The Average Daily Flow – ADF (annual average daily flow) and Peak Wet Weather Flow – PWWF (maximum daily flow) were then estimated based largely on using observed ratios of ADF:ADWF and PWWF:ADWF.

The key assumptions were as follows:

- Waikato District Council's 2013/14 consent compliance monitoring data was used to determine the wastewater inflows to the WWTP expressed as ADWF, ADF and PWWF (previous years were also reviewed).
- For larger schemes the future ADWF per capita generation rate was assumed to be 200 L/person/day if the observed per capita rate was lower than 200.
- For the smaller schemes of Maramarua, Te Kowhai and Matangi, lower per capita per capita ADWF rates consistent with those given in AS/NZS 1547:2012 – On-site Domestic Wastewater Management were used. A per capita generation rate of 145 L/person/day was used for Matangi based on households with a reticulated supply and water reduction fixtures. A per

capita generation rate of 115 L/person/day was used for Maramarua and Te Kowhai based on households with a roof-water supply and water reduction fixtures.

- The ADWF includes both residential and non-residential wastewater. The approach assumes that non-residential growth is proportional to residential growth except for schemes with known large industrial customers. Allowances were made for new industrial wastewater discharges in the forecasts for Mid Waikato and North Waikato.
- The flow forecasts are baseline forecasts based on a single set of growth assumptions and with no allowance for reduction in wastewater flows due to water demand management activities or an inflow and infiltration programme.

The influent flow assumptions are summarised in Table 2-2 by wastewater scheme.

Table 2-2: WWTP influent flow assumptions

Wastewater Scheme	ADWF L/person/day	Annual average ratio (ADF:ADWF)	Peak wet weather ratio (PWWF:ADWF)	Comment on industrial customers
Central District	200	1.3	3.7	
Huntly	240	1.3	5.5	
Mid Waikato	250	1.3	6.3*	Springhill additional ADWF & ADF of 200 m³/day
Raglan	200	1.5	5.5	
Meremere	200	1.5	15	
North Waikato	200	1.3	3.7*	Three new industrial customers: Yashili, Brinks and Lowe Corporation
Maramarua	145	1.3	1.7	
Te Kowhai	115	1.9	11	
Matangi	200	1.4	2.3	
Tauwhare Pa	115	1.6	3	

* New connections in Mid Waikato and North Waikato were assumed to have a PWWF ratio of 3 as they are likely to be in greenfield developments with new pipes rather than infill in the existing system.

Load forecasts have not been included in this strategy report as a detailed assessment of scheme specific loads needs to be carried out as part of specific WWTP upgrade investigations for each scheme. Information about the hydraulic and process loading capacity of the majority of the existing WWTPs and associated expected treatment standards was not readily available at the time of preparing the Strategy.

2.7 Uncertainties in the flow forecasts

There will always be uncertainties inherent in flow forecasts and the aim is to minimise these where possible (and adopt a conservative approach). The key uncertainties related to the current WDC wastewater flow forecasts are as follows:

- The most significant uncertainty is the residential connection/population growth forecasts. Actual growth may be higher or lower than forecast. Ideally, at least two growth scenarios should be prepared to provide an envelope for forecasting (i.e. an upper and lower bound).
- The baseline flow forecast is a simple high level approach that uses a per capita production rate rather than developing sector based production rates. This may lead to high uncertainty if, for example, future non-residential growth is proportionally higher than the residential population growth.
- The peak wet weather flow forecasts are highly dependent on the peak wet weather flow ratio assumption which may vary and could be reduced through the successful implementation of inflow and infiltration reduction programme.

3 Assessment of each wastewater scheme

3.1 Introduction to the wastewater scheme assessments

The following sub-sections provide an introduction to each wastewater scheme along with a summary of the key infrastructure issues and the strategic option assessment. Recommended investigations for each scheme identified through the issues and options assessment are outlined in Section 4.1.

A Multi-Criteria Assessment (MCA) workshop was held with Council staff to undertake a strategic assessment of potential future wastewater servicing options for the five larger schemes with a WWTP owned and operated by Waikato District Council (i.e. Central District, Huntly, Mid Waikato, Raglan and Meremere). The workshop used a two-tiered weighting process with qualitative criteria (technical/functionality, operational, future consentability/environmental effects, social/cultural) and quantitative (cost) criteria. The MCA workshop results are summarised in the appendix to the Stage 1 report "Wastewater Strategy Multi-Criteria Assessment Workshop Record". The outcomes of the workshop have been used to identify a preferred option for predicting capital infrastructure requirements for Central District, Huntly, Mid Waikato, Raglan and Meremere.

The other schemes were not discussed at the MCA workshop. This was deemed appropriate due to either the nature and/or scale of existing schemes and proposed options, and the availability of time on the day of the workshop. Council feedback on the strategic options for the remaining 5 schemes was sought via correspondence following the workshop.

The indicative capital infrastructure forecasts for the district are tabled in Section 4.2.

3.2 Central District

3.2.1 Introduction to the Central District scheme

The Central District scheme services the main township of Ngaruawahia and the communities of Hopuhopu, Horotiu and Taupiri. Wastewater is collected from the towns and pumped to the Ngaruawahia Wastewater Treatment Plant (WWTP), which is located about midway between Ngaruawahia and Hopuhopu. The WWTP comprises inlet screening, oxidation pond, solids removal (Actiflo), UV disinfection, gravel channels and a discharge to the Waikato River.

3.2.2 Central District scheme flow forecasts and issues

The current Ngaruawahia WWTP discharge resource consent contains a maximum discharge flow limit of 11,200m³/day. Peak inflows are not predicted to exceed this over the 50 year horizon of this strategy.

The 2013 Ngaruawahia WWTP upgrade was based on an ADWF of 2,500 m³/day and a PWWF of 6,000 m³/day. ADWFs are not predicted to exceed this over the 50 year horizon of this strategy. Peak flows are predicted to exceed this in 2036, however, given the historical variation in peak flows from year to year and inflow and infiltration issues, it is recommended that this is reviewed at consent expiry.

The Ngaruawahia and Huntly WWTPs have a combined summer median load limit for Total Nitrogen of 57 kg/day and for Total Phosphorus of 17.3 kg/day.

Based on predicted future loads and predicted performance of the Huntly and Ngaruawahia WWTPs when the Actiflo unit at Ngaruawahia is operating optimally, the Ngaruawahia and Huntly WWTPs are not predicted to exceed the combined summer mass load limits for nitrogen and phosphorous before the consent expiry of 2028.

The ability to meet the current mass load limits beyond 2028 depends on the performance of Huntly WWTP and any future upgrades at that plant. If both Ngaruawahia and Huntly WWTP have Actiflo units installed sized for appropriate future flows, the existing combined summer mass load limit for nitrogen may be able to be achieved over the horizon of the strategy. However, actual WWTP performance and flows should be reviewed closer to consent expiry. Any consents obtained beyond 2028 may be more stringent.

3.2.3 Central District options assessment

The alternative options evaluated at the MCA workshop for long term wastewater treatment for the Central District scheme included maintaining the existing WWTP with augmentations as required, construction of a new advanced WWTP, transfer of flows to the Hamilton City Council (HCC) Pukete WWTP (either all wastewater or just wastewater flows from growth) and land irrigation.

Upgrading the existing Ngaruawahia WWTP to cater for future growth is the lowest cost long term solution on the basis that more stringent river discharge standards are not imposed when a renewal is sought for the resource consent. If a major augmentation to the plant was required in 2028 to meet new more stringent consent limits ($14M), the transfer to the HCC Pukete WWTP would be seen as a better long term solution based on the overall Multi Criteria Assessment (MCA). No discussions with HCC have been held in regard to the overall viability of a transfer to Pukete. Upgrading the existing WWTP to cater for future growth is the preferred option carried forward to the capital infrastructure requirements.

Development of the industrial area in Horotiu with wet industry that has significant trade waste discharges may impact on the capacity of the existing WWTP to meet effluent discharge quality levels through to 2029.

The 2008 Assessment of Environmental Effects (AEE) submitted to Waikato Regional Council stated that land irrigation of effluent was not considered feasible, primarily due to the restrictions associated with dairy farming.

A consolidated option was considered for both the Central District and Huntly schemes and is discussed further in Section 3.3.4.

3.3 Huntly

3.3.1 Introduction to the Huntly scheme

The Huntly scheme services the main township of Huntly, the Te Ohaaki Marae and the surrounding community. Wastewater is collected and pumped to the Huntly Wastewater Treatment Plant (WWTP), which is located to the north of Huntly. The WWTP comprises inlet screening, septage receival plant, oxidation ponds, UV disinfection, wetlands, “rock-lined” channels, and a discharge to the Waikato River.

3.3.2 Huntly scheme flow forecasts and issues

The current Huntly WWTP discharge resource consent contains a maximum discharge flow limit of 11,500 m³/day. Peak inflows are predicted to exceed this over the 50 year horizon of this strategy. However, based on observed 2014 PWWF inflow (10,000 m³/day) and 2014 maximum daily discharge flow (5,170 m³/day), there is a reduction of 48% through the plant due to the oxidation ponds buffering peak flows. Assuming peak flow attenuation of at least 40% through the plant, the maximum flow discharge is not predicted to exceed the consent limit over the horizon of this strategy.

The 2013 Huntly WWTP upgrade was based on an ADWF of 2,500 m³/day and a PWWF of 6,500 m³/day. ADWFs are not predicted to exceed this over the 50 year horizon of this strategy. Peak inflows currently exceed the PWWF design basis however the upgrade was for treatment units located after the secondary oxidation pond. Based on peak flow attenuation of at least 40% through the plant, peak flows to treatment units after the secondary oxidation pond are seldom likely to exceed the PWWF design flow over the 50 year horizon of this strategy. However, given the inflow and infiltration issues, it is recommended that this is reviewed at consent expiry.

The comments in Section 3.2.2 on the combined performance of the Huntly and Ngaruawahia WWTPs are also relevant to the Huntly WWTP but have not been repeated in this sub-section.

3.3.3 Huntly options assessment

The alternative options evaluated at the MCA workshop for long term wastewater treatment for the Huntly scheme included maintaining the existing WWTP with augmentations as required, construction of a new advanced WWTP, transfer of flows to a new advanced WWTP at Ngaruawahia and land irrigation.

These options are similar to the options for the Central District scheme and similar conclusions were drawn.

Upgrading the existing Huntly WWTP to cater for future growth is seen as the most sustainable long term solution on the basis that more stringent river discharge standards are not imposed when a renewal is sought for the resource consent. If more stringent discharge limits are imposed in 2028 the construction of a new advanced WWTP would be the preferred option.

3.3.4 Consolidated option for Central District and Huntly schemes

As mentioned in Section 3.2.3, a consolidated option was considered for both the Central District and Huntly schemes. If major augmentations are required at both Ngaruawahia and Huntly WWTPs in 2028 to meet future consents, the provision of a new centrally located advanced WWTP servicing both areas is considered to be the best long term solution based on the overall MCA. Alternatively, whilst not evaluated at the MCA workshop, treated wastewater from Huntly could be transferred to Ngaruawahia WWTP for further treatment to remove nutrients and pathogens only (i.e. bypassing the oxidation pond). This is likely to be a less expensive option, but is dependent on how stringent future consent requirements are.

3.4 Mid Waikato

3.4.1 Introduction to the Mid Waikato scheme

The Mid Waikato scheme services the main township of Te Kauwhata, the community of Rangiriri and the Springhill Correction Facility. Wastewater is collected and pumped to the Te Kauwhata WWTP, which is located to the south of Te Kauwhata township. The WWTP comprises inlet screening, aerated ponds with Aquamats, wetland, rock filter and a discharge to Lake Waikare.

3.4.2 Mid Waikato scheme flow forecasts and issues

The current Te Kauwhata WWTP discharge resource consent contains an average annual flow discharge limit of 1,100 m³/day and a maximum flow discharge limit of 3,600 m³/day. Average and peak inflows are predicted to exceed this near the time the current consent expires. However, based on observed 2014 PWWF inflow (2,061 m³/day) and 2014 maximum daily discharge flow (1,670 m³/day), there is a reduction of 19% through the plant. Based on this reduction, the maximum flow discharge is predicted to consistently exceed the current consent limit around 2045. Average inflows are of the same of order as average discharge flows.

Based on the design flows and loads in the operations and maintenance manual, current performance of WWTP as a whole (rather than individual process units), predicted flows, reduced influent load due to closure of Richmond Meat Works and clause under service agreement with Springhill Corrections Facility that current maximum flow limit will not increase from 300m³/day to 400m³/day unless there is sufficient capacity at the WWTP, the current WWTP is predicted to exceed the WWTP capacity over the 50 year horizon of this strategy but may continue to comply with the current consent limits until near the time the current consent expires. At this time, it is probable that any new consent will have more stringent consent conditions, requiring a significant WWTP upgrade.

3.4.3 Mid Waikato options assessment

The alternative options evaluated at the MCA workshop for long term wastewater treatment for Mid Waikato included a number of options for upgrading of the existing WWTP, relocating the point of discharge from the Lake to the Waikato River, maintaining a lake discharge with improved standard of treatment, development of a land irrigation scheme for effluent disposal and transferring the wastewater to either the Huntly WWTP or Pokeno (for treatment at Watercare WWTP at Pukekohe).

Discharge to the Waikato River with rapid infiltration columns was seen as the preferred long term solution for the Mid Waikato scheme.

3.5 Raglan

3.5.1 Introduction to the Raglan scheme

The Raglan scheme services the main township of Raglan and settlement on Whaanga Coast. Wastewater is collected and conveyed to the Raglan Wastewater Treatment Plant (WWTP), which is located to the south west of Raglan. The WWTP comprises septage receival facility, screening, anaerobic ponds, aerated ponds with Aquamats, holding pond, UV disinfection, and a discharge to Raglan Harbour. There is also a sludge storage pond.

3.5.2 Raglan scheme flow forecasts and issues

The current Raglan WWTP discharge resource consent contains a maximum flow discharge limit of 3,400 m³/day. Peak inflows currently exceed this limit, typically by a factor of about 1.2 (although the highest flow was observed in 2012/13 and represented an exceedence by a factor of 1.8). However, based on observed 2013 and 2014 PWWF inflows (6,000 m³/day and 4,165 m³/day, respectively) and 2013 and 2014 maximum daily discharge flows (3,749 m³/day and 2,602 m³/day, respectively), there is a reduction in peak flows of 38% through the plant. Based on this reduction, the maximum flow discharge is predicted to consistently exceed the current consent limit near the time the current consent expires in 2020, with occasional breaches from time to time before that (i.e. as was observed in 2012/13).

The WWTP has consistently exceeded the consent concentration limits for total suspended solids since commissioning of the aerated ponds with Aquamats. An upgrade options assessment report prepared in 2013 recommended that a floating wetland system be installed as a cost-effective way to reduce solids, however it noted that there may still be occasional periods of elevated solids in the treated wastewater. The next least expensive option identified that would be able to consistently achieve consent limits and not have operation issues with algal solids was an Actiflo or DAF unit.

The WWTP also regularly exceeds the concentration limits for pathogens. The existing UV system is rated for a maximum flow of approximately 6,000 m³/day. Provided the concentration of total suspended solids is reduced to comply with consent limits prior to disinfection, it is likely that treated wastewater discharge will be able to comply with pathogen consent limits at least up to the current consent expiry date.

3.5.3 Raglan options assessment

The alternative options evaluated at the MCA workshop for long term wastewater treatment for the Raglan scheme included maintaining the existing WWTP with augmentations as required, construction of a new outfall and effluent irrigation to land.

Provision of a new ocean outfall was the preferred option for Raglan from the MCA workshop. Affordability of this option by the local community would need to be assessed before proceeding further. Alternatively, upgrading the existing WWTP to cater for future growth, provide some nutrient reduction, and attenuate peak flows would comprise a suitable long term solution provided that significantly more stringent discharge standards are not imposed when a renewal is sought for the Raglan WWTP discharge resource consent.

3.6 Meremere

3.6.1 Introduction to the Meremere scheme

The Meremere scheme services the township of Meremere. Wastewater is collected and conveyed to the Meremere Wastewater Treatment Plant (WWTP), which is located to the north of Meremere. The WWTP comprises an oxidation pond, subsurface wetland, holding pond, UV disinfection, and a discharge to the Waikato River.

3.6.2 Meremere scheme flow forecasts and issues

The current Meremere WWTP discharge resource consent (expiry in 2018) contains a maximum flow discharge during wet weather of 480 m³/day and during dry weather of 160 m³/day. Recent historic peak wet weather discharge flows have exceeded this limit, typically by a factor of about 3. Dry weather discharge flows are not predicted to exceed this over the 50 year horizon of this strategy.

The WWTP currently consistently exceeds the consent limit for all parameters except pathogens. Based on typical design guidelines and dimensions provided in the Activity Management Plan, the existing oxidation pond should have sufficient capacity for the predicted loads, however the current consent limits are stringent for a pond-based WWTP. The capacity of the UV disinfection system is not stated in Operations and Maintenance Manual, however is expected to be satisfactory over the horizon of the strategy given the minimal increase in population and flows (i.e. about 5%), the current performance, and typical replacement period.

3.6.3 Meremere options assessment

The alternative options evaluated at the MCA workshop for long term wastewater treatment for the Meremere scheme included maintaining the existing WWTP with augmentations as required, transfer of flows to Pokeno (for treatment at Watercare WWTP at Pukekohe), transfer of flows to the Te Kauwhata WWTP and land irrigation. Construction of a new advanced WWTP was ruled out prior to the MCA workshop.

Transferring flows from Meremere to Pokeno was seen as the preferred long term solution from a non-financial viewpoint. Given the high cost ($42,650/residential property), the affordability of this option for the local community would need to be assessed before progressing further. Upgrading the existing WWTP in order to be able to consistently meet the current discharge consent standards was the lowest cost option and may be the most commercially viable long term solution.

Existing river discharge standards are very stringent and cannot be guaranteed with pond based technology. Discussions with WRC regarding the potential for regional based consent limits for discharges to the Waikato River to consolidate the Total Nitrogen load limits for Ngaruawahia, Huntly, Meremere (and potentially Te Kauwhata in future) maybe a better way to approach the upcoming renewal of the resource consent for Meremere given the relative cost for transfer to Pokeno or the construction of a new regional advanced WWTP.

The capital infrastructure forecasts have been shown as either transfer to Pokeno (Watercare) OR upgrade the existing Meremere WWTP for flow balancing, TN (Total Nitrogen) and Total Suspended Solids (TSS) control.

3.7 North Waikato

3.7.1 Introduction to the North Waikato scheme

The North Waikato scheme services the townships of Tuakau and Pokeno. Wastewater is collected from the townships of Tuakau and Pokeno and transferred to the Pukekohe Wastewater Treatment Plant (WWTP), which is located west of Tuakau and is owned and operated by Watercare.

3.7.2 North Waikato scheme flow forecasts and issues

The current Watercare agreement for the North Waikato schemes states the maximum discharge flow to the Pukekohe WWTP from Waikato District Council sources is 1,500 m³/day over and above 2014 flows until 2019, when the Pukekohe WWTP will be upgraded. This flow allowance is for all wastewater sources in North Waikato scheme. It is understood there is no flow limit agreed beyond 2019. The agreement does not include a definition of the 2014 baseline or of the maximum discharge flow.

Based on information in the Watercare agreement, Yashili (the new milk powder facility) appears to have been allocated 1,400 m³/day from 2015 when it commences. In addition, WDC has agreed to supply Brinks (poultry processing facility) and Lowe Corporation (agricultural processing facility). In total Yashili, Brinks and Lowe Corporation would contribute an estimated peak discharge flow of 1,800 m³/day in 2017, which alone exceeds the maximum discharge flow in the Watercare agreement.

The predicted increase in ADWF from North Waikato, excluding Yashili, Brinks and Lowe Corporation, between 2014 and 2019 is approximately 500 m³/day. While the predicted increase in PWWF over the same period is approximately 1,100 m³/day. The increases are primarily due to the forecast rapid residential development growth in the Pokeno and Tuakau townships.

The current Watercare agreement also states maximum discharge concentration and load limits to the Pukekohe WWTP from Waikato District Council sources. Estimated concentrations and loads from Yashili, Brinks and Lowe Corporation have not been provided to MWH, however based on the predicted flows the load limits would be exceeded even if wastewater discharged from these facilities is pre-treated to a “domestic” strength wastewater.

3.7.3 North Waikato options assessment

The long term servicing for Pokeno and Tuakau remains with the status quo of discharge of wastewater to the Pukekohe WWTP owned by Watercare. Infrastructure growth charges will apply for new development and requirements to manage trade waste discharge quality into the wastewater network will remain with WDC.

There are short term flow constraints on discharges to the Watercare system until the next upgrade of the Pukekohe WWTP which is scheduled to be completed by 2019. WDC will need to manage flow increases from new trade waste customers to ensure that adequate residual capacity exists to cater for the rapid residential growth that is occurring in Pokeno.

3.8 Matangi

3.8.1 Introduction to the Matangi scheme

The Matangi scheme services the Matangi settlement. Wastewater is collected from individual septic tanks and pumped to the Matangi (WWTP), which comprises septic tanks, outlet filters and recirculating sand filters, and a discharge to land.

3.8.2 Matangi scheme flow forecasts and issues

The current Matangi WWTP discharge resource consent contains a maximum flow limit of 52 m^3/day. Historic peak discharge flows have exceeded this on occasion and are expected to consistently exceed this from 2020. The buffering of peak flows through the plant cannot be estimated due to the lack of WWTP inflow data.

Based on areas stated in the Activity Management Plan, current flows and typical loading rates, the existing sand filter is at or near capacity and the land application system is undersized.

3.8.3 Matangi options assessment

The alternative options for long term wastewater treatment for Matangi include maintaining the existing WWTP with augmentations as required, combining the treatment of wastewater from Matangi and Tauwhare (3.7km apart) at either Matangi WWTP or Tauwhare WWTP and connect to the HCC wastewater network.

The option to combine treatment of wastewater from Matangi and Tauwhare WWTPs (3.7km apart) and the option to transfer to the HCC wastewater network (6km) were both ruled out due to high cost.

Therefore, retaining the existing WWTP with local expansion to meet future growth is the preferred option. A detailed assessment of the existing WWTP is recommended to confirm existing design capacity and develop and cost augmentation works to meet the forecast future flow projections. This is expected to include some peak flow detention and recirculation and expansion of the filtration and land application systems.

3.9 Maramarua

3.9.1 Introduction to the Maramarua scheme

The Maramarua scheme services the Maramarua settlement. Wastewater is collected and conveyed to the Maramarua (WWTP), which comprises septic tanks, outlet filters and recirculating sand filters, and a discharge to land.

3.9.2 Maramarua scheme flow forecasts and issues

The current Maramarua WWTP discharge resource consent contains a maximum flow limit of 6 m³/day. Historic peak flows have consistently exceeded this.

Based on areas stated in the Activity Management Plan, current flows and typical loading rates, the existing sand filter is at or near capacity.

3.9.3 Maramarua options assessment

The alternative options for long term wastewater treatment for Maramarua include maintaining the existing WWTP with augmentations as required or handing back the WWTP to the local community (Body Corporate).

A detailed assessment of the existing WWTP is recommended to confirm existing design capacity and develop and cost augmentation works to meet the forecast future flow projections. This might include some peak flow detention and recirculation and expansion of the filtration and land application systems.

Further discussion would be required with the local community if handing back of this asset was proposed. WDC may offer to provide ongoing operations and maintenance support at an agreed annual charge to ensure that the facilities are appropriately maintained.

3.10 Tauwhare Pa

3.10.1 Introduction to the Tauwhare Pa scheme

The Tauwhare Pa scheme services the Tauwhare Marae and surrounding area. Wastewater is pumped from individual properties to the Tauwhare Pa (WWTP), which comprises septic tanks, outlet filters and recirculating textile filters, and a discharge to land.

3.10.2 Tauwhare Pa scheme flow forecasts and issues

The current Tauwhare Pa WWTP discharge resource consent contains a maximum flow limit of 63 m³/day. Peak flows are predicted to consistently exceed this after 2025.

The WWTP is currently breaching treated wastewater quality limits in resource consent, suggesting additional loads cannot be accommodated without a WWTP upgrade.

The 2011 Tauwhare Pa WWTP upgrade was based on existing design ADWF and PWWF capacities of 24 m³/day and 63 m³/day, respectively. It is not clear what the future design ADWF and PWWF (i.e. capacity) for the existing WWTP is, however the resource consent application gives a future ADWF and PWWF of 45 m³/day and 119 m³/day, respectively. As the current consent limit is 63 m³/day, it is assumed that WWTP capacity is at least as large as the stated existing design ADWF.

3.10.3 Tauwhare Pa options assessment

The alternative options for long term wastewater treatment for Tauwhare Pa include maintaining the existing WWTP with augmentations as required, combining the treatment of wastewater from Matangi and Tauwhare (3.7km apart) at either Matangi WWTP or Tauwhare WWTP and connecting to the HCC wastewater network.

The option to combine treatment of wastewater from Matangi and Tauwhare WWTPs (3.7km apart) and the option to transfer to the HCC wastewater network (10km) were both ruled out due to high cost.

Therefore, retaining the existing Tauwhare Pa WWTP with local expansion to meet future growth is the preferred option. A detailed assessment of the existing WWTP is recommended to confirm existing design capacity and develop and cost augmentation works to meet the forecast future flow projections.

3.11 Te Kowhai

3.11.1 Introduction to the Te Kowhai scheme

The Te Kowhai scheme services the Te Kowhai settlement. Wastewater is collected from individual septic tanks and pumped to the Te Kowhai (WWTP), which comprises a septic tank, outlet filter and recirculating sand filters, and a discharge to land.

3.11.2 Te Kowhai scheme flow forecasts and issues

The current Te Kowhai WWTP discharge resource consent contains a maximum flow limit of 12 m³/day.

There is a large discrepancy between observed WWTP discharge flows and predicted WWTP inflows. Potential reasons for this are given in the Stage 1 report. Until site investigations are carried out to assess actual inflows to the WWTP, it is considered prudent to use published per capita generation rates for the purpose of assessing future strategic requirements as these rates give higher predicted flows.

Based on areas stated in the Activity Management Plan, current observed flows and typical loading rates, the existing sand filter is at or near capacity. The area of the land application system is not stated in the Activity Management Plan.

3.11.3 Te Kowhai options assessment

The alternative options for long term wastewater treatment for Te Kowhai include maintaining the existing WWTP with augmentations as required and connecting to the HCC wastewater network (6km away).

Retaining the existing Tauwhare Pa WWTP with local expansion to meet future growth is the preferred option. There are a significant number of other residential properties in Te Kowhai that are on local septic tanks. Further development of this township may dictate a need for the provision of sewerage services, or conversely, the provision of reticulated sewerage services to the township may facilitate additional growth.

A detailed assessment of the existing WWTP is recommended to confirm existing design capacity and develop and cost augmentation works to meet the forecast future flow projections. This might include some peak flow detention and recirculation and expansion of the effluent filtration and land application system.

4 Wastewater strategy outcomes

4.1 Wastewater investigations

The assessment of the wastewater scheme infrastructure issues identified a number of recommended investigations that are required in the short term in addition to the capital infrastructure investments required over the 50 year horizon.

The recommended investigations that are common to multiple wastewater schemes are outlined in Table 4-1. The recommended investigations that are specific to individual wastewater schemes are outlined in Table 4-2. There are additional minor investigations required for the four smaller schemes (Matangi, Maramarua, Tauwhare Pa and Te Kowhai) that are not included in Table 4-2. The Stage 1 report details the minor investigations required for the four smaller schemes.

Table 4-1: Recommended investigations common to multiple wastewater schemes

Recommended investigation	Relevant wastewater schemes
Continue inflow and infiltration (I&I) strategy and implementation plan for each scheme with high I&I, including develop hydraulic models, investigate sources of I&I and undertake remedial measures to the sewer network where required.	Central District, Huntly, Mid Waikato, Raglan, Meremere, North Waikato, Matangi, Maramarua, Tauwhare Pa and Te Kowhai
Investigate the infrastructure requirements for installation of emergency storage at local pumpstations to manage overflow risk.	Central District, Huntly, Raglan and North Waikato
Investigate disposal options for biosolids currently stored in geobags and monitor WWTP performance to gauge impact of supernatant pumped from geobags to pond.	Central District and Huntly
Investigate district-wide or regional sludge/biosolids treatment and reuse/disposal options.	Central District, Huntly, Mid Waikato, Raglan and Meremere
Investigate source of odour issues (e.g. long retention times in network can cause septicity and odour released at inlet works, anaerobic ponds).	Central District, Huntly and Raglan
Investigate potential (through discussions with WRC) for regional-based, combined mass load (nitrogen and phosphorous) consent limits for discharges to the Waikato River from WDC WWTPs.	Central District, Huntly, Meremere and potentially Te Kauwhata in the future
Undertake a detailed assessment for each of the existing Matangi, Maramarua, Tauwhare Pa and Te Kowhai WWTPs to confirm existing design capacity and then develop and cost augmentation works to meet the forecast future flow projections.	Matangi, Maramarua, Tauwhare Pa and Te Kowhai

Table 4-2: Recommended WWTP investigations specific to an individual wastewater scheme

Wastewater scheme	Recommended investigation	Infrastructure issue
Central District	Confirm hydraulic capacity of Ngaruawahia WWTP and discharge pipeline.	Peak flows expected to exceed Ngaruawahia WWTP design capacity from 2036 and an increased proportion of flow can bypass Actiflo and UV disinfection which may breach consent limits.
Huntly	Investigate need for solids removal.	Reduced performance at Huntly WWTP can lead to breaches of combined Huntly/Ngaruawahia WWTP summer nutrient mass load consent limit
Huntly	Confirm hydraulic capacity of Huntly WWTP and discharge pipeline before replacement of outfall pipeline.	Peak flows may occasionally exceed Huntly WWTP design capacity and an increased proportion of flow can bypass UV disinfection which may breach consent limits.
Huntly	Assess existing mechanical and electronic access system for Huntly septage handling facility and investigate options for improvement. Review septage quantities received at plant and monitor	Septage handling facility not reliable (blockages, failing electronic access system). Leads to increased operational input and waste other than septage being disposed of. Also leads to greater loads to WWTP, which increases sludge generation and disposal frequency.

Wastewater scheme	Recommended investigation	Infrastructure issue
	flow and loads discharged to inlet works.	
Huntly	Review WWTP performance in 2015 and then review wetland access if retained beyond 2018	WWTP review required as part of current discharge consent to determine contribution of wetlands to overall WWTP performance. Access to wetland is poor. Leads to inadequate maintenance and reduced performance
Mid Waikato	Review significant industrial/commercial flows and revise baseline flow forecasts if required	Baseline flow forecasts based on data available at time of preparing the Stage 1 report and assumptions provided by WDC. Flows from Springhill Corrections Facility comprise a significant proportion of total inflows to Te Kauwhata WWTP.
Mid Waikato	Consider flood protection measures for Mid Waikato wetland and rock filters.	Flooding of wetland and rock filters during rain events reduces treatment performance and can lead to breaches of consent limits and increased maintenance of wetland and rock filters.
Mid Waikato	Review wetland access	Access to wetland is poor. Leads to inadequate maintenance and reduced performance
Raglan	Carry out sludge survey of sludge stored in the Raglan WWTP sludge pond to determine remaining capacity of pond.	Sludge is currently stored in either the sludge pond or the anaerobic and aerated ponds. Storage in the anaerobic and aerated ponds reduces capacity of pond and treatment performance and the pond de-sludging affects effluent quality. Remaining capacity of the sludge pond is unknown.
North Waikato	Review baseline flow forecasts to include significant industrial/commercial flows and discuss any potential issue with Watercare.	The baseline flow forecasts for North Waikato (from the assumptions provided by WDC) are expected to exceed the limits (flow, concentration and load) in the Watercare Agreement between 2014 and 2019. Limits post 2019 were not available at the time of preparing the Stage 1 report.
Matangi, Maramarua, Tauwhare Pa and Te Kowhai	Miscellaneous investigations as identified in the Stage 1 report	The existing treatment facilities are at or near capacity leading to issues with consent compliance.

4.2 Wastewater capital projections

Indicative wastewater capital cost forecasts for 2015/25 Long Term Plan derived from this strategy are listed in Table 4-3. The capital cost estimates are high level indicative capital cost estimates for strategic planning purposes only and are based on indicative unit rates with limited site specific details. Typical levels of accuracy of +/-30%. The capital cost estimates are the current cost estimates in 2014 with no allowance for future inflation. The list of included and excluded costs is detailed in the Stage 1 report.

Requirements for wastewater network and transfer system upgrades are unable to be determined at this stage. Further detailed modelling of each catchment should be undertaken to determine impacts of future growth, extent of local I&I issues and requirements for asset reliability improvements to meet target levels of service and overflow limits. Installation of emergency storage at local pumpstations was identified as a requirement for managing overflow risk and included in Table 4-3 but has not yet been costed due to the need for more investigation.

Minor capital works are not included in Table 4-3 but are detailed in the scheme specific sections of the Stage 1 report (e.g. upgrading wetland access at Huntly and Te Kauwhata).

Table 4-3: Indicative wastewater capital cost forecasts for 2015/25 Long Term Plan

Wastewater Scheme	Capital infrastructure	Indicative capital cost estimate	Financial year for capital cost	Trigger(s)	Assumptions
Central District, Huntly, Raglan and North Waikato	Install emergency storage at pump stations	TBD	Ongoing	Observed overflows	Provision of emergency storage capacity at all local pump stations in each scheme (all pump stations in Central District, Huntly and North Waikato but only the 5 main local pump stations at Raglan initially).
Central District	Upgrade the existing Ngaruawahia WWTP for TN/TP and peak flow	$3.1M	2028	Consent expiry, consented discharge load limits	Future discharge consent TN concentrations and mass load limits are the same as existing. An Actiflo unit and TN reduction is provided at Huntly WWTP.
Huntly	Upgrade the existing Huntly WWTP for TN/TP and peak flow	$2M-$5M	2015	Consented discharge concentration limits	Install Actiflo unit to reduce algal solids, septage receival upgrade, may require wetlands upgrade.
		$3M	2028	Consent expiry, consented discharge load limits	TN reduction is provided at Huntly WWTP. Future discharge consent TN concentrations and mass load limits are the same as existing.
Mid Waikato	Pipeline to Waikato River and Rapid infiltration columns	$5M	2028	Consent expiry, consented discharge concentration, load and flow limits	New consent will not permit continued discharge to the Lake but will allow discharge to Waikato River with similar effluent quality limits as current consent.
Raglan	EITHER New ocean outfall and septage receival	$13.3M	2015	Consented discharge concentration and flow limits	High community cost option which would need to be tested.
	OR Upgrade the existing Raglan WWTP for TSS/ ammonia, sludge drying, septage receival and peak flow	$1.6M	2015	Consented discharge concentration and flow limits	Actiflo unit or equivalent for TSS reduction plus increased outlet capacity or flow balancing to manage PWWF tidal discharge. Note: Capital and operating costs may be lower if investigations show a disc filter can be used instead of an Actiflo unit.
		$2.9M	2020	Consent expiry	Possible need for ammonia reduction depending on future consent conditions, sludge drying beds and improved septage handling.

Wastewater Scheme	Capital infrastructure	Indicative capital cost estimate	Financial year for capital cost	Trigger(s)	Assumptions
Meremere	EITHER Transfer to Pokeno (Watercare) OR Upgrade WWTP for flow balancing, TN and TSS control	$8.7M OR $2M	2015	Consented discharge concentration and flow limits	Transfer costs include Watercare infrastructure growth charges (IGC) for 204 connections but exclude any upsizing allowance for the transfer system from Pokeno to Watercare network. WWTP upgrade costs assume some relaxing of existing consents. May ultimately need an advanced WWTP (not included in cost)

5 Recommendations

Recommendations for improving the Waikato District Council's wastewater strategy include:

- Adopt the capital infrastructure projections as a minimum requirement.
- Develop adequate network models for each community and confirmation of transfer capacities and upsizing requirements for future growth.
- Develop an inflow and infiltration strategy for each community (currently in progress) and develop plans for inflow and infiltration reduction (e.g. smoke testing, grouting, replacements, installation of lines). Scope and price to be developed as part of ongoing asset management planning.
- Improve understanding of condition and performance of existing assets and budgets for ongoing operation, maintenance and renewal needs to be bought from asset management planning budgets into overall capital budgets.
- Undertake capacity assessment of existing pump stations and available emergency service provisions with a view to augment pump stations to agreed level of service compliance (may include provision of emergency storage capacity, pumps, improvements to electrical supply etc.).
- Finalise requirements for ultimate SCADA system and implementation of upgrades across existing pump stations and treatment plants and the local control centre.
- Identify location and requirements for existing network overflows (e.g. capacity, compliance, likely frequency of spill) and develop a long term plan for overflow management.
- Investigate options and prepare a long term plan for sludge management across the district (including discussions with sub-regional councils).
- Identify and develop a plan to address odour issues associated with the wastewater network (note – allowance has been made for odour control ONLY for strategic options that require long transfer of flows in this project).
- Review the residential forecasts after the University of Waikato National Institute of Demographic and Economic Analysis revise the Future Proof projections following the release of further 2013 Census data on families and households.
- Investigate the potential impacts of climate change on assets and future performance.

6 Glossary of terms

Word or Acronym	Definition
ADF	Average Daily Flow (usually this is the annual average daily wastewater inflow)
ADWF	Average Dry Weather Flow (usually this is the lowest of the monthly average daily wastewater inflows for the months of December to April)
AEE	Assessment of Environmental Effects
BOD	Biochemical Oxygen Demand
E.coli	Escherichia Coliforms
HCC	Hamilton City Council
IGC	Infrastructure growth charges (charged by Watercare for connection of new development)
LTP	Long Term Plan. A plan that describes what the Council is planning to do for the next 10 years and how they will pay for it. Prepared every 3 years.
MCA	Multi-Criteria Assessment. An evaluation method that involves scoring various scenarios against a defined set of criteria that represent what is good and bad about

Word or Acronym	Definition
	any particular option
MOU	Memorandum of Understanding
NH_4N	Ammonia Nitrogen
PWWF	Peak Wet Weather Flow (usually this is the annual maximum daily wastewater inflow)
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TP	Total Phosphorous
TSS	Total Suspended Solids
UV	Ultra-violet disinfection
WDC	Waikato District Council
WRC	Waikato Regional Council
WWTP	Wastewater treatment plant

Appendix A : Tables of Connection and Flow Forecasts

Table A-1: Central District Wastewater Scheme Number of Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	2,239	6,493	1,299	1,688	4,805
2016	2,263	6,563	1,313	1,706	4,857
2017	2,287	6,633	1,327	1,725	4,908
2018	2,311	6,703	1,341	1,743	4,960
2019	2,335	6,773	1,355	1,761	5,012
2020	2,359	6,840	1,368	1,778	5,062
2021	2,384	6,910	1,382	1,797	5,113
2022	2,409	6,980	1,396	1,815	5,165
2023	2,434	7,050	1,410	1,833	5,217
2024	2,459	7,120	1,424	1,851	5,269
2025	2,485	7,190	1,438	1,869	5,321
2030	2,642	7,612	1,522	1,979	5,633
2035	2,822	8,081	1,616	2,101	5,980
2040	3,002	8,545	1,709	2,222	6,323
2045	3,182	9,004	1,801	2,341	6,663
2050	3,362	9,459	1,892	2,459	7,000
2055	3,542	9,914	1,983	2,578	7,336
2060	3,722	10,369	2,074	2,696	7,673
2065	3,902	10,824	2,165	2,814	8,010

Table A-2: Huntly Wastewater Scheme Number of Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts)

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	2,760	7,618	1,828	2,377	10,056
2016	2,777	7,665	1,840	2,391	10,118
2017	2,794	7,712	1,851	2,406	10,180
2018	2,811	7,759	1,862	2,421	10,242
2019	2,828	7,806	1,873	2,435	10,304
2020	2,847	7,857	1,886	2,451	10,371
2021	2,865	7,905	1,897	2,466	10,435
2022	2,883	7,953	1,909	2,481	10,498
2023	2,901	8,001	1,920	2,496	10,561
2024	2,919	8,049	1,932	2,511	10,625
2025	2,939	8,100	1,944	2,527	10,692
2030	3,053	8,391	2,014	2,618	11,076
2035	3,151	8,635	2,072	2,694	11,398
2040	3,241	8,855	2,125	2,763	11,689
2045	3,331	9,075	2,178	2,831	11,979
2050	3,421	9,295	2,231	2,900	12,269
2055	3,511	9,515	2,284	2,969	12,560
2060	3,601	9,735	2,336	3,037	12,850
2065	3,691	9,955	2,389	3,106	13,141

Table A-3: Mid Waikato Wastewater Scheme Number of Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	488	1,249	512	606	2,202
2016	534	1,367	542	644	2,291
2017	580	1,485	571	683	2,379
2018	626	1,603	601	721	2,468
2019	672	1,721	630	759	2,556
2020	717	1,832	658	795	2,639
2021	768	1,958	690	836	2,734
2022	819	2,084	721	877	2,828
2023	870	2,210	753	918	2,923
2024	921	2,336	784	959	3,017
2025	973	2,460	815	1,000	3,110
2030	1,249	3,113	978	1,212	3,600
2035	1,388	3,434	1,059	1,316	3,841
2015	488	1,249	512	606	2,202
2016	534	1,367	542	644	2,291
2017	580	1,485	571	683	2,379
2018	626	1,603	601	721	2,468
2019	672	1,721	630	759	2,556
2020	717	1,832	658	795	2,639

Table A-4: Raglan Wastewater Scheme Number of Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	1,828	4,149	830	1,245	4,564
2016	1,842	4,181	836	1,254	4,599
2017	1,856	4,213	843	1,264	4,634
2018	1,870	4,245	849	1,274	4,670
2019	1,884	4,277	855	1,283	4,705
2020	1,897	4,305	861	1,292	4,736
2021	1,911	4,336	867	1,301	4,770
2022	1,925	4,367	873	1,310	4,804
2023	1,939	4,398	880	1,319	4,838
2024	1,953	4,429	886	1,329	4,872
2025	1,969	4,463	893	1,339	4,909
2030	2,027	4,584	917	1,375	5,042
2035	2,088	4,710	942	1,413	5,181
2040	2,148	4,830	966	1,449	5,313
2045	2,208	4,950	990	1,485	5,445
2050	2,268	5,070	1,014	1,521	5,577
2055	2,328	5,190	1,038	1,557	5,709
2060	2,388	5,310	1,062	1,593	5,841
2065	2,448	5,430	1,086	1,629	5,973

Table A-5: Meremere Wastewater Scheme Number of Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	177	538	108	161	1,614
2016	180	547	109	164	1,641
2017	183	556	111	167	1,668
2018	186	565	113	170	1,695
2019	189	574	115	172	1,722
2020	192	583	117	175	1,749
2021	191	580	116	174	1,740
2022	190	577	115	173	1,731
2023	189	574	115	172	1,722
2024	188	571	114	171	1,713
2025	188	571	114	171	1,713
2030	183	556	111	167	1,668
2035	183	556	111	167	1,668
2040	183	556	111	167	1,668
2045	183	556	111	167	1,668
2050	183	556	111	167	1,668
2055	183	556	111	167	1,668
2060	183	556	111	167	1,668
2065	183	556	111	167	1,668

Table A-6: North Waikato Number of Wastewater Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts, Excluding Yashili (2015), Brinks (2016) and Lowe (2017)

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	1,646	4,609	922	1,198	3,358
2016	1,781	4,987	997	1,297	3,585
2017	1,916	5,365	1,073	1,395	3,812
2018	2,051	5,743	1,149	1,493	4,039
2019	2,186	6,121	1,224	1,591	4,266
2020	2,320	6,483	1,297	1,686	4,483
2021	2,586	7,201	1,440	1,872	4,914
2022	2,852	7,919	1,584	2,059	5,344
2023	3,118	8,637	1,727	2,246	5,775
2024	3,384	9,355	1,871	2,432	6,206
2025	3,651	10,052	2,010	2,614	6,624
2030	4,420	12,049	2,410	3,133	7,822
2035	4,897	13,250	2,650	3,445	8,543
2040	5,197	13,995	2,799	3,639	8,990
2045	5,497	14,739	2,948	3,832	9,436
2050	5,797	15,479	3,096	4,025	9,880
2055	6,097	16,219	3,244	4,217	10,324
2060	6,397	16,959	3,392	4,409	10,768
2065	6,697	17,699	3,540	4,602	11,212

Table A-7: North Waikato Number of Wastewater Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts, Including Yashili (2015), Brinks (2016) and Lowe (2017)

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	1,646	4,609	2,322	2,598	4,758
2016	1,781	4,987	2,597	2,897	5,185
2017	1,916	5,365	2,873	3,195	5,612
2018	2,051	5,743	2,949	3,293	5,839
2019	2,186	6,121	3,024	3,391	6,066
2020	2,320	6,483	3,097	3,486	6,283
2021	2,586	7,201	3,240	3,672	6,714
2022	2,852	7,919	3,384	3,859	7,144
2023	3,118	8,637	3,527	4,046	7,575
2024	3,384	9,355	3,671	4,232	8,006
2025	3,651	10,052	3,810	4,414	8,424
2030	4,420	12,049	4,210	4,933	9,622
2035	4,897	13,250	4,450	5,245	10,343
2040	5,197	13,995	4,599	5,439	10,790
2045	5,497	14,739	4,748	5,632	11,236
2050	5,797	15,479	4,896	5,825	11,680
2055	6,097	16,219	5,044	6,017	12,124
2060	6,397	16,959	5,192	6,209	12,568
2065	6,697	17,699	5,340	6,402	13,012

Table A-8: Matangi Wastewater Scheme Number of Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	59	167	24	31	41
2016	63	178	26	34	44
2017	67	189	27	36	47
2018	71	200	29	38	49
2019	75	211	31	40	52
2020	81	227	33	43	56
2021	86	241	35	45	59
2022	91	255	37	48	63
2023	96	269	39	51	66
2024	101	283	41	53	70
2025	104	291	42	55	72
2030	132	365	53	69	90
2035	139	385	56	73	95
2040	139	385	56	73	95
2045	139	385	56	73	95
2050	139	385	56	73	95
2055	139	385	56	73	95
2060	139	385	56	73	95
2065	139	385	56	73	95

Table A-9: Maramarua Wastewater Scheme Number of Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	9	24	3	5	30
2016	9	24	3	5	30
2017	9	24	3	5	30
2018	9	24	3	5	30
2019	9	24	3	5	30
2020	9	24	3	5	30
2021	9	24	3	5	30
2022	9	24	3	5	30
2023	9	24	3	5	30
2024	9	24	3	5	30
2025	9	24	3	5	30
2030	9	24	3	5	30
2035	9	24	3	5	30
2040	9	24	3	5	30
2045	9	24	3	5	30
2050	9	24	3	5	30
2055	9	24	3	5	30
2060	9	24	3	5	30
2065	9	24	3	5	30

Table A-10: Tauwhare Pa Wastewater Scheme Number of Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	44	128	26	36	59
2016	45	131	26	37	60
2017	46	134	27	38	62
2018	47	137	27	38	63
2019	48	140	28	39	64
2020	47	137	27	38	63
2021	47	137	27	38	63
2022	47	137	27	38	63
2023	47	137	27	38	63
2024	47	137	27	38	63
2025	49	142	28	40	65
2030	55	159	32	45	73
2035	55	159	32	45	73
2040	55	159	32	45	73
2045	55	159	32	45	73
2050	55	159	32	45	73
2055	55	159	32	45	73
2060	55	159	32	45	73
2065	55	159	32	45	73

Table A-11: Te Kowhai Wastewater Scheme Number of Residential Connections, Population, Average Dry Weather Flow (ADWF), Average Daily Flow (ADF), and Peak Wet Weather Flow (PWWF) Forecasts

Financial Year Ending	Residential Connections	Population	ADWF (m^3/day)	ADF (m^3/day)	PWWF (m^3/day)
2015	23	62	7	11	21
2016	24	65	7	12	22
2017	25	68	8	13	23
2018	26	71	8	13	24
2019	27	74	9	14	26
2020	26	71	8	13	24
2021	27	74	9	14	26
2022	28	77	9	14	27
2023	29	80	9	15	28
2024	30	83	10	15	29
2025	29	81	9	15	28
2030	32	87	10	16	30
2035	33	89	10	16	31
2040	33	89	10	16	31
2045	33	89	10	16	31
2050	33	89	10	16	31
2055	33	89	10	16	31
2060	33	89	10	16	31
2065	33	89	10	16	31